

# 9.2

## The Pythagorean Theorem

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- Goals**
- Prove the Pythagorean Theorem.
  - Use the Pythagorean Theorem to solve problems.

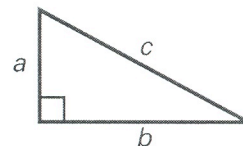
### VOCABULARY

Pythagorean triple

### THEOREM 9.4: PYTHAGOREAN THEOREM

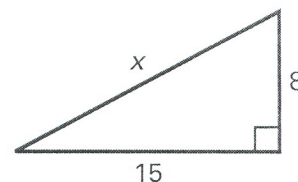
In a right triangle, the \_\_\_\_\_ of the length of the hypotenuse is equal to the sum of the \_\_\_\_\_ of the lengths of the legs.

$$c^2 = a^2 + b^2$$



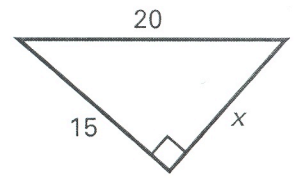
### Example 1 Finding the Length of a Hypotenuse

Find the length of the hypotenuse of the right triangle. Tell whether the side lengths form a Pythagorean triple.

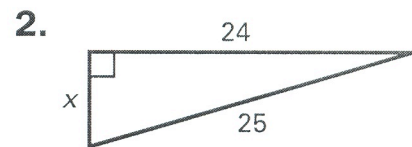
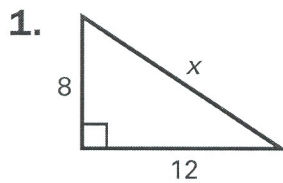


**Example 2** Finding the Length of a Leg

Find the length of the leg of the right triangle.



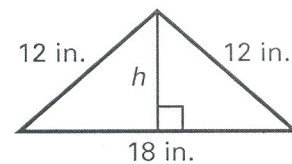
- ✓ **Checkpoint** Find the value of  $x$ . Simplify answers that are radicals. Then tell whether the side lengths form a Pythagorean triple.



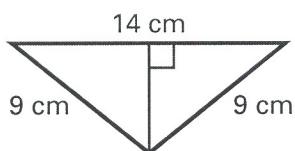
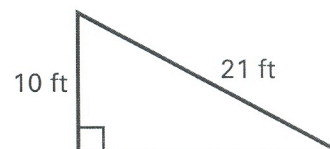
**Example 3****Finding the Area of a Triangle**

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Find the area of the triangle to the nearest tenth of a square inch.

**Solution**

✓ **Checkpoint** Find the area of the triangle. Round your answer to the nearest tenth.

**3.****4.**

**Practice****The Pythagorean Theorem**

If  $c$  is the measure of the hypotenuse, find each missing measure.  
Round to the nearest tenth, if necessary.

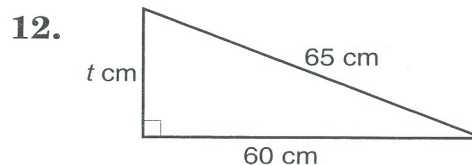
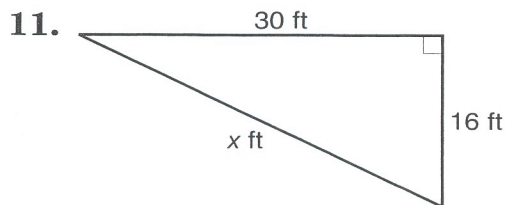
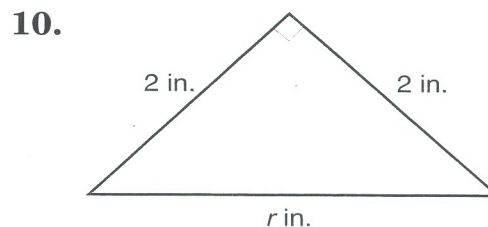
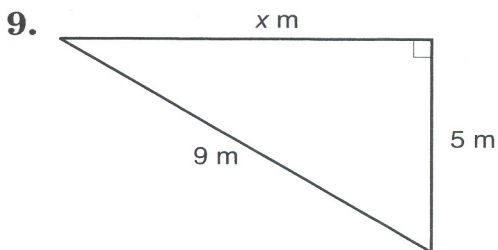
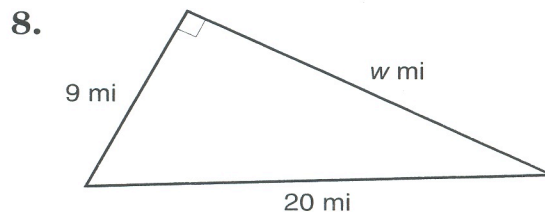
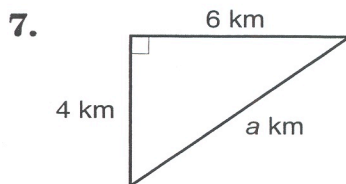
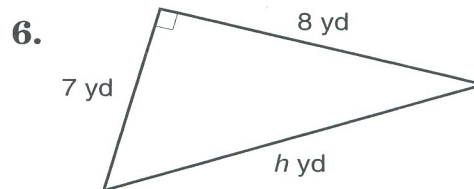
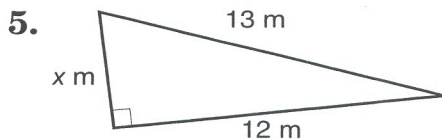
1.  $a = 8, b = 13, c = ?$

2.  $a = 4, c = 6, b = ?$

3.  $a = \sqrt{13}, b = \sqrt{12}, c = ?$

4.  $b = \sqrt{52}, c = \sqrt{101}, a = ?$

Find the missing measure in each right triangle. Round to the nearest tenth, if necessary.



The lengths of three sides of a triangle are given. Determine whether each triangle is a right triangle.

13. 14 ft, 48 ft, 50 ft

14. 50 yd, 75 yd, 85 yd

15. 15 cm, 36 cm, 39 cm

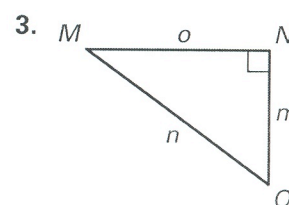
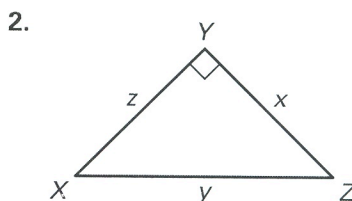
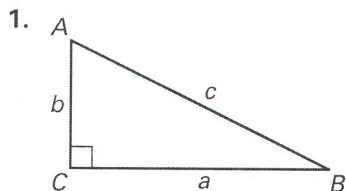
16. 45 mm, 60 mm, 80 mm



# Practice A

For use with pages 535–541

Use the labeled triangles to state the Pythagorean Theorem.



Simplify the radical.

4.  $\sqrt{12}$

5.  $\sqrt{48}$

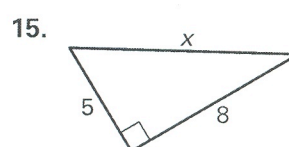
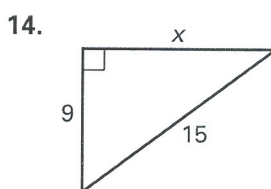
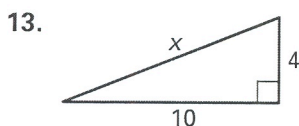
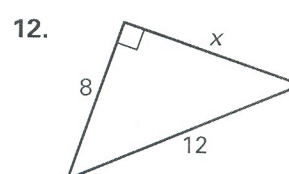
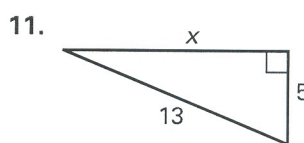
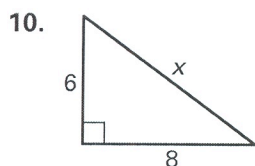
6.  $\sqrt{20}$

7.  $\sqrt{18}$

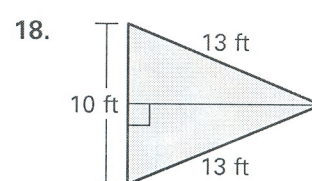
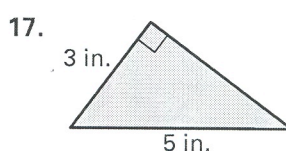
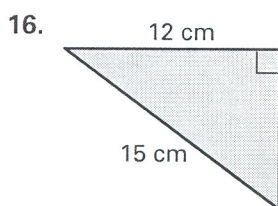
8.  $\sqrt{60}$

9.  $\sqrt{75}$

Find the unknown side length. Simplify answers that are radicals.  
Tell whether the side lengths form a Pythagorean triple.



Find the area of the figure. Round decimal answers to the nearest tenth.



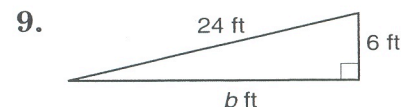
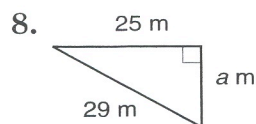
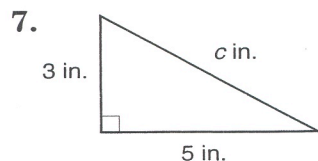
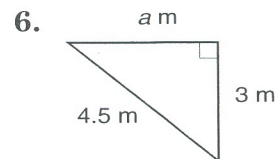
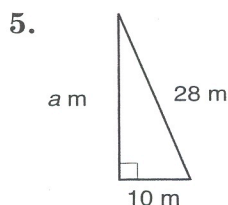
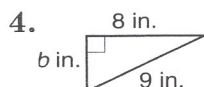
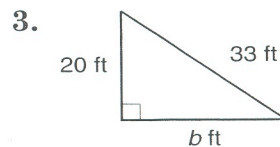
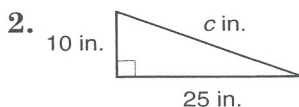
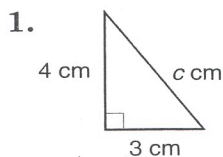
Solve. Round your answer to the nearest tenth.

19. A 48-inch wide screen television means that the measure along the diagonal is 48 inches. If the screen is a square, what are the dimensions of the length and width?
20. The doorway of the family room measures  $6\frac{1}{2}$  feet by 3 feet. What is the length of the diagonal of the doorway?
21. You place a 10-foot ladder against a wall. If the base of the ladder is 3 feet from the wall, how high up the wall does the top of the ladder reach?

## Skills Practice

### The Pythagorean Theorem

Find the missing measure in each right triangle. Round to the nearest tenth, if necessary.



Find each missing measure if  $c$  is the measure of the hypotenuse. Round to the nearest tenth, if necessary.

10.  $a = 15$ ,  $b = 10$ ,  $c = ?$

11.  $b = 6$ ,  $c = 10$ ,  $a = ?$

12.  $c = 100$ ,  $b = 60$ ,  $a = ?$

13.  $c = 16$ ,  $a = 9$ ,  $b = ?$

14.  $a = 2$ ,  $b = 3$ ,  $c = ?$

15.  $c = 5$ ,  $b = 2$ ,  $a = ?$

16.  $b = 7$ ,  $c = 15$ ,  $a = ?$

17.  $c = 30$ ,  $a = 20$ ,  $b = ?$

The lengths of three sides of a triangle are given. Determine whether each triangle is a right triangle.

18. 3 cm, 4 cm, 5 cm

19. 1 ft, 1 ft, 2 ft

20. 2 in., 2 in., 4 in.

21. 8 m, 15 m, 17 m

22. 5 in., 10 in., 15 in.

23. 14 cm, 48 cm, 50 cm